

**Title: Eyes on the Eagle****Brief Overview:**

This unit explores population statistics for the American Bald Eagle. Students will organize and present data and plan a field trip. The unit will culminate with a presentation to the school administration.

**Links to NCTM 2000 Standards:**

- **Mathematics as Problem Solving, Reasoning and Proof, Communication, Connections, and Representation**

These five process standards are threads that integrate throughout the unit, although they may not be specifically addressed in the unit. They emphasize the need to help students develop the processes that are the major means for doing mathematics, thinking about mathematics, understanding mathematics, and communicating mathematics.

- **Number and Operation**

Mathematics instructional programs should foster the development of number and operation sense so that all students use computational tools and strategies fluently and estimate appropriately.

- **Data Analysis, Statistics and Probability**

Mathematics instructional programs should include attention to data analysis, statistics, and probability so that all students interpret data using methods of exploratory data analysis.

**Links to National Science Education Standards:**

- **Unifying Concepts and Processes**

Systems, order, and organization of data allows students to interpret and make predictions about future needs in the world.

- **Life Science**

The study of the populations and ecosystems of species allows students to understand the need for conservation in all parts of the world.

**Grade/Level:**

Grades 6-8

**Duration/Length:**

This lesson will take 6-8 class periods.

**Prerequisite Knowledge:**

Students should have working knowledge of the following skills:

- Number operations
- Applications of graphing and chart construction
- Writing skills
- Basic statistics

## **Student Outcomes:**

Students will:

- collect, organize, graph, interpret, and analyze data.
- plan and calculate the cost of a field trip.
- write a persuasive letter.

## **Materials/Resources/Printed Materials:**

- Student worksheets
- Tape measures
- National Wildlife Federation's "Keep The WILD Alive!" pamphlet
- Internet Web Sites:
  - Arizona Zoo - <http://www.Suzuki.or/eagle.hum>
  - American Museum of Natural History - <http://www.Amman.or/exhibitions/endangered/eagle/eagle.html>
  - The Eagle Page - <http://www.sky.net/~Emily/eagle.html>
  - U.S. Fish and Wildlife Service - <http://www.phase.go/r9endspp/i/b0h.html>
  - Virginia - [www.va.go/articles/celebam/eagle.hum](http://www.va.go/articles/celebam/eagle.hum)

## **Development/Procedures:**

- **Days 1/2:**

Begin with an "eagle" web exercise. Students should research and report on facts related to the bald eagle. This report should include a history of the animal and its reason for selection as a national symbol, as well as its physical characteristics, habitat, diet, dangers to existence, and optimal environment. Students should complete Worksheets #1 and #2 individually. If necessary, assist students with developing a map key.
- **Day 3:**

Students will continue exploration of eagle characteristics by comparing various wingspans of raptors and other students. The teacher will demonstrate accurate measurement of student "wingspan," which should be measured from fingertip to fingertip with arms outstretched. Students may need assistance with determining an appropriate scale for the graph. Have students complete Worksheet #3.
- **Day 4:**

Begin with a teacher-led discussion/web activity regarding field trip planning. Students will be given Worksheet #4A and Worksheet #4B to be worked on in small group settings. Each student is responsible for the completion of Worksheet #4B with the help of his or her group.
- **Days 5/6:**

Students should be given an opportunity to "sell" the trip that they have planned to their classmates. Allow time for groups to give oral presentations explaining which trip they thought was the most economical and which trip they thought would enable them to see the most eagles. These presentations should include participation from all group members. As a culminating activity for the unit, have students use Worksheet #5 to write a persuasive letter to their principal explaining why he or she should allow them to go on the trip they have planned. Their letter should include some of what they have been learning about eagles, the cost of the trip, and the number of eagles that have been sighted at that location.

**Performance Assessment:**

Evaluate student worksheets and oral presentation using scoring rubrics.

**Extension/Follow Up:**

Some extension activities include:

- Importance and significance of the bald eagle in Native American culture
- Usage of the bald eagle in American currency
- Expressions of “eagle” used in language
- Historical population trends of the bald eagle
- Role of the bald eagle in the ecosystem
- Legislation involving the bald eagle
- Bald eagle recovery investigations

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Name \_\_\_\_\_  
Date \_\_\_\_\_

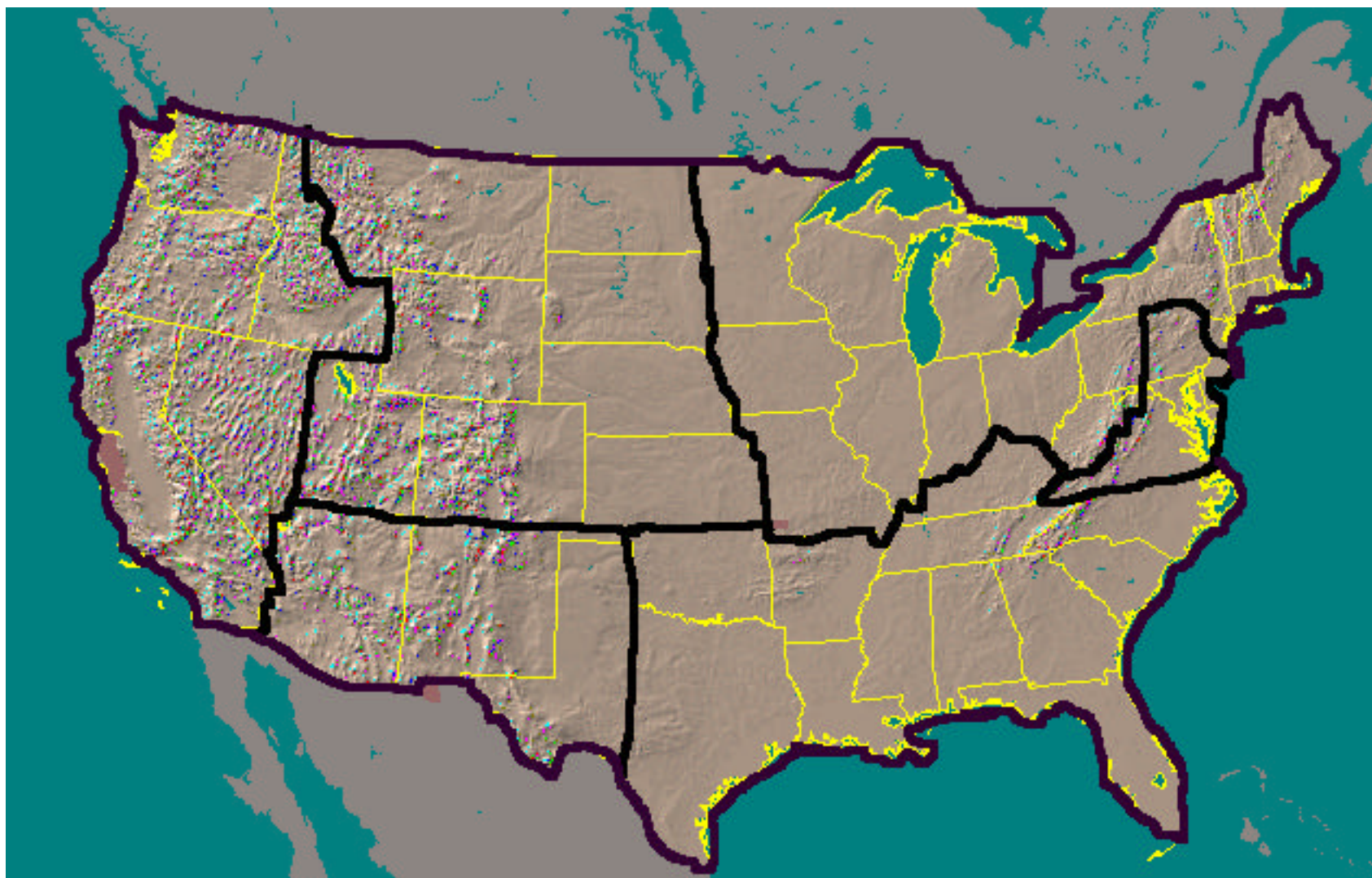
## Worksheet #1

**Directions:** Organize the data from the paragraph below into the chart provided.

Eagle populations can be found in all 48 continental United States. According to the U.S. Fish and Wildlife Service, in 1999 there were 1,480 breeding pairs in the Pacific region. The number of young produced in this region was 1,702. In the Southwestern region, there were 40 breeding pairs and 25 young. In the Northern region, there were 2,204 breeding pairs and 2,623 young. In the Southeastern region, there were 1,485 breeding pairs and 1,708 young. Finally, there were 539 breeding pairs and 652 young in the Chesapeake region.

Geographic Region	_____	_____

Using the material you have organized into the chart above, complete the map on the attached page to show the eagle populations in each region. Be sure to include a legend, color coded by region, with your map.



Name Answer Key

Worksheet #1

Date

**Directions:** Organize the data from the paragraph below into the chart provided.

Eagle populations can be found in all 48 continental United States. According to the U.S. Fish and Wildlife Service, in 1999 there were 1,480 breeding pairs in the Pacific region. The number of young produced in this region was 1,702. In the Southwestern region, there were 40 breeding pairs and 25 young. In the Northern region, there were 2,204 breeding pairs and 2,623 young. In the Southeastern region, there were 1,485 breeding pairs and 1,708 young. Finally, there were 539 breeding pairs and 652 young in the Chesapeake region.

<b>Geographic Region</b>	<b>Number of Breeding Pairs</b>	<b>Number of Young</b>
Pacific	1,480	1,702
Southwestern	40	25
Northern	2,204	2,623
Southeastern	1,485	1,708
Chesapeake	539	652

Using the material you have organized into the chart above, complete the map on the attached page to show the eagle populations in each region. Be sure to include a legend, color coded by region, with your map.

Name \_\_\_\_\_  
Date \_\_\_\_\_

## Worksheet #2

**Directions:** Complete the worksheet using information from the class discussion or other independent research.

1. Describe the physical characteristics of the bald eagle.

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2. What habitat is ideal for a bald eagle? Why?

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3. In which region would you be most likely to view bald eagles? Why?

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Name Answer Key  
Date

## Worksheet #2

**Directions:** Complete the worksheet using information from the class discussion or other independent research. Be sure to answer each question in complete sentences.

1. Describe the physical characteristics of the bald eagle.

•dark brown with a white head and tail      •wing span (male: 6 ft.; female: 6.5-7 ft.)  
•7 years to reach full maturity      •feet and beak are yellow  
•40 inches tall •light weight due to hollow bones  
•male weighs 9-10 pounds •each pair hatches 2-3 eggs per year  
•female weighs 14 pounds      •35 day gestation period

(5 of the above facts should be included in complete sentences.)

2. What habitat is ideal for a bald eagle? Why?

A bald eagle makes its home inland along coastal areas, large lakes and rivers, and marshes where it has the best chance of catching fish which is its main diet. Forests are also necessary. The eagle can live anywhere that there is water.

3. In which region would you be most likely to view bald eagles? Why?

Answers will vary but must be supported by the students.

Name \_\_\_\_\_  
Date \_\_\_\_\_

### Worksheet #3

## Comparing “Wingspans”

1. Today you will be comparing the “wingspan” of humans with that of the Bald Eagle and other raptors. Begin by measuring your height and “wingspan” and recording this data below.

My “wingspan” \_\_\_\_\_ cm      My partner’s “wingspan” \_\_\_\_\_ cm  
My height \_\_\_\_\_ cm      My partner’s height \_\_\_\_\_ cm

2. Record **class** data on the table below:

	WINGSPAN	HEIGHT
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		

3. What patterns do you see in the class data?

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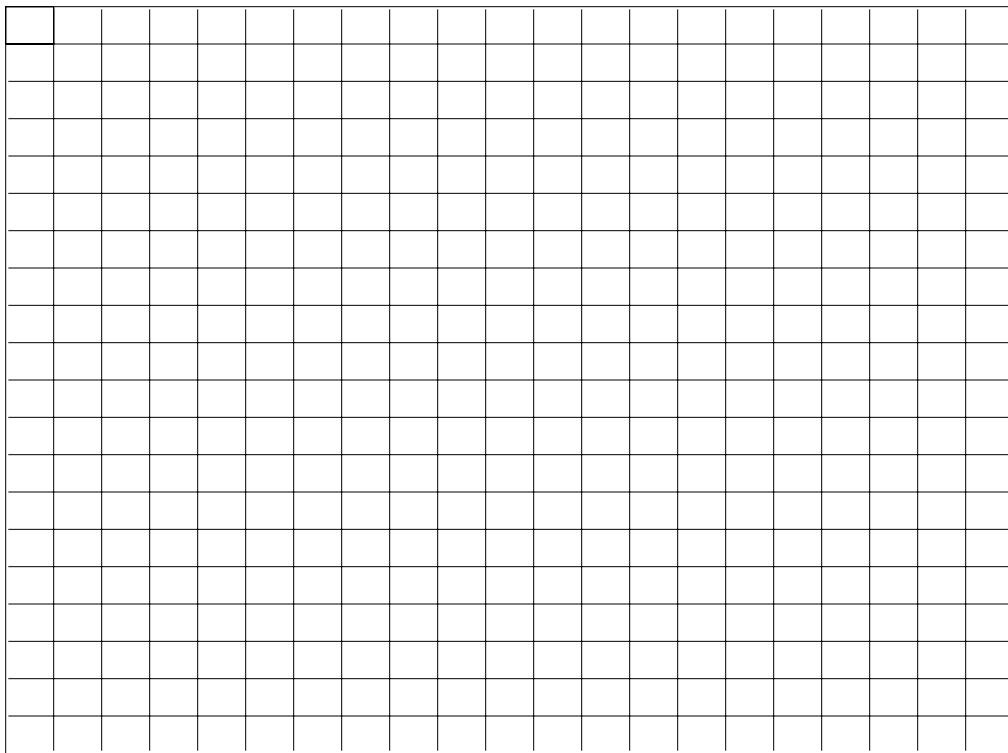
4. What would you expect a scatter plot of this data to look like? Why?

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5. **Graph the class data on the graph below to find out if there is a relationship between wingspan and raptor height.**



6. Using a different color, graph the following data for wingspan and body length of the Turkey Vulture, Red-Tailed Hawk, Peregrine Falcon and Bald Eagle on the graph above.

	<b>Raptor</b>	<b>Wingspan</b>	<b>Height (length)</b>
1	Turkey Vulture	171 cm	67 cm
2	Red-Tailed Hawk	125 cm	49 cm
3	Peregrine Falcon	116 cm	46 cm
4	Bald Eagle	203 cm	79 cm

7. Explain how raptor wingspans compare to the student “wingspans” on your graphs. What might be the reason this difference?

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Name Answer Key  
Date \_\_\_\_\_

**Worksheet #3**

**Comparing “Wingspans”**

1. Today you will be comparing the “wingspan” of humans with that of the Bald Eagle and other raptors. Begin by measuring your height and “wingspan” and recording this data below.

My “wingspan” Various cm  
My height Various cm

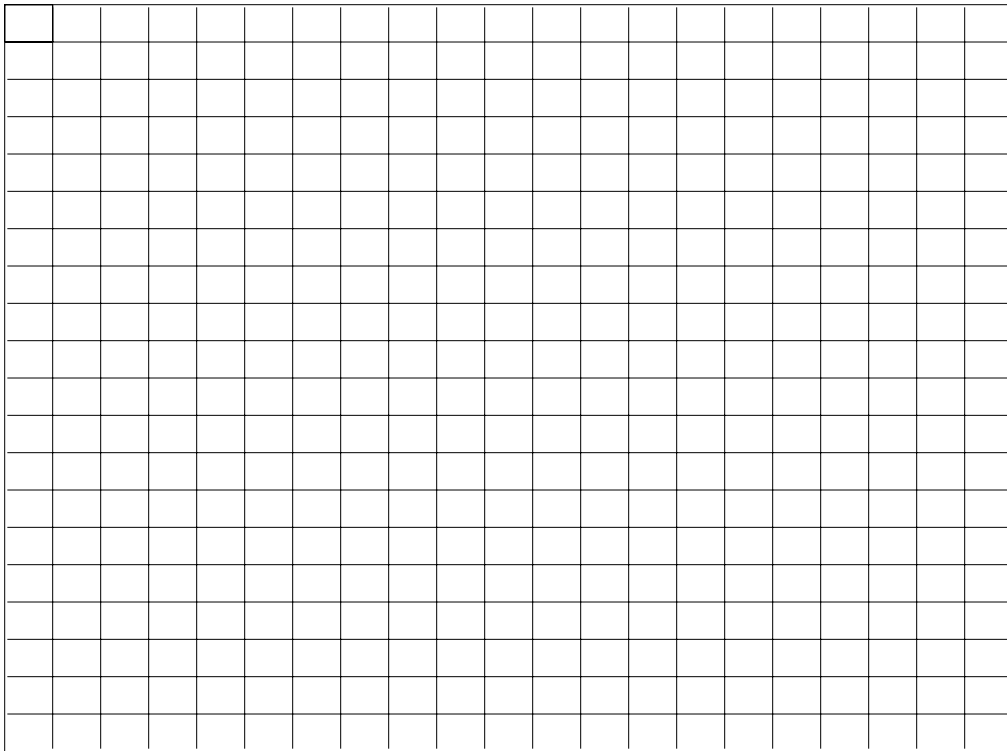
My partner’s “wingspan” Various cm  
My partner’s height Various cm

2. Record **class** data on the table below:

**WINGSPAN      HEIGHT**

1	DATA	
2	WILL	
3	VARY	
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
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19		
20		
21		
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23		
24		
25		
26		

3. What patterns do you see in the class data?  
Students should notice that their “wingspans” and height are approximately equal. Answers should be in complete sentences.
4. What would you expect a scatter plot of this data to look like? Why?  
Students should come to the conclusion that the scatter plot would form a straight line that bisects the grid from the bottom left corner to the top right corner of the square. Again, student answers should be in complete sentences and include a thorough explanation of their prediction.
5. **Graph the class data on the graph below to find out if there is a relationship between wingspan and raptor height.**



6. Using a different color, graph the following data for wingspan and body length of the Turkey Vulture, Red-Tailed Hawk, Peregrine Falcon and Bald Eagle on the graph above.

	<b>Raptor</b>	<b>Wingspan</b>	<b>Height (length)</b>
1	Turkey Vulture	171 cm	67 cm
2	Red-Tailed Hawk	125 cm	49 cm
3	Peregrine Falcon	116 cm	46 cm
4	Bald Eagle	203 cm	79 cm

7. Explain how raptor wingspans compare to the student “wingspans” on your graphs. What might be the reason for this difference?

Answers will vary. Teacher may wish to discuss ratio relationships.

### **Rubric for Worksheet 1**

- 4 Map and chart accurately completed, including a color coded legend.
- 3 Map and chart accurately completed, legend is missing.
- 2 Chart completed.
- 1 Attempt made at assignment.
- 0 Assignment not submitted.

### **Rubric for Worksheet 2**

- 4 Questions 1-3 answered thoroughly and completely.  
Question 1 lists at least six facts.  
Question 2 lists at least three characteristics.  
Question 3 has a minimum of six sentences that fully support the student's concepts.
- 3 Questions 1-3 answered partially.  
Question 1 lists at least four facts.  
Question 2 lists at least two characteristics.  
Question 3 has less than six sentences that partially support the student's concepts.
- 2 Incomplete assignment.  
Two of three questions answered partially.
- 1 Incomplete assignment.  
One of three questions answered partially.
- 0 Assignment not submitted.

### **Rubric for Worksheet 3**

- 4 All seven components are completed accurately with narrative questions answered in complete sentences.  
All responses are supported by student.  
Graphs are labeled correctly.
- 3 Five of seven components are completed correctly, including graph and data chart.  
Narrative responses are supported partially.
- 2 Three of seven components are completed correctly, including graph and data chart that may be partially complete.  
Narrative responses are unclear and not supported.
- 1 Incomplete assignment.  
One or two components completed.
- 0 Assignment not submitted.

Name  
Date

## Worksheet #4A

### **BALD EAGLE SIGHTINGS**

Bald eagles have been spotted in several locations within a seventy-five mile radius of your school. You are to plan a field trip for twenty-five students using the following information. You are to develop two plans: (1) Most economical and (2) Most likely sightings.

#### **Locations Of Bald Eagle Sightings:**

**SIGHT #1** - Twenty-five miles from the school, 5 mated pairs have been sighted.

**SIGHT #2** - Fifty miles from the school, 15 mated pairs have been sighted.

**SIGHT #3** - Seventy miles from the school, 35 mated pairs have been sighted.

#### **Caterers To Supply Lunches (Choose One):**

<b>CATERER #1</b>	- Sandwich, Chips, Cookie, Soft Drink	\$ 4.25 per person
<b>CATERER #2</b>	- Sandwich, Chips, Soft Drink	\$17.50 per 5 persons
<b>CATERER #3</b>	- Sandwich, Cookie, Soft Drink	\$37.50 per 10 persons
<b>CATERER #4</b>	- Sandwich, Fruit, Soft Drink	\$75.00 per 20 persons

#### **Bus Companies To Provide Transportation (Choose One):**

<b>BUS COMPANY #1</b>	- \$50.00 plus \$5.00/mile for each additional mile over 20 miles
<b>BUS COMPANY #2</b>	- \$75.00 plus \$4.75/mile for each additional mile over 20 miles
<b>BUS COMPANY #3</b>	- \$100.00 plus \$3.75/mile for each additional mile over 20 miles
<b>BUS COMPANY #4</b>	- \$125.00 plus \$3.50/mile for each additional mile over 20 miles

Name \_\_\_\_\_  
Date \_\_\_\_\_

**Worksheet #4B**

**BALD EAGLE SIGHTINGS FIELD TRIP**

**MOST ECONOMICAL FIELD TRIP:**

LOCATION: \_\_\_\_\_  
CATERER: \_\_\_\_\_  
BUS COMPANY: \_\_\_\_\_  
TOTAL COST OF TRIP (CLASS): \_\_\_\_\_  
TOTAL COST OF TRIP (INDIVIDUAL): \_\_\_\_\_

Explain why you chose the above companies and how you computed the class cost and individual cost of the trip.

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**MOST LIKELY SIGHTINGS TRIP:**

LOCATION: \_\_\_\_\_  
CATERER: \_\_\_\_\_  
BUS COMPANY: \_\_\_\_\_  
TOTAL COST OF TRIP (CLASS): \_\_\_\_\_  
TOTAL COST OF TRIP (INDIVIDUAL): \_\_\_\_\_

Explain why you chose the above companies and how you computed the class cost and individual cost of the trip.

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Name Answer Key  
Date \_\_\_\_\_

**Worksheet #4B**

**BALD EAGLE SIGHTINGS FIELD TRIP**

**MOST ECONOMICAL FIELD TRIP:**

LOCATION: SIGHT #1  
CATERER: CATERER #2 - \$87.50  
BUS COMPANY: BUS COMPANY #1 - \$75.00  
TOTAL COST OF TRIP (CLASS): \$162.50  
TOTAL COST OF TRIP (INDIVIDUAL): \$6.50

Explain why you chose the above companies and how you computed the class cost and individual cost of the trip.

Answers will vary. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**MOST LIKELY SIGHTINGS TRIP:**

LOCATION: SIGHT #3  
CATERER: CATERER #2 - \$87.50  
BUS COMPANY: BUS COMPANY #3 - \$287.50  
TOTAL COST OF TRIP (CLASS): \$375.00  
TOTAL COST OF TRIP (INDIVIDUAL): \$15.00

Explain why you chose the above companies and how you computed the class cost and individual cost of the trip.

Answers will vary. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Rubric for Worksheet 4B

- 4** Identifies and gives a thorough explanation for the most economical trip.  
Identifies and gives a thorough explanation for the trip with the most possible eagle sightings.  
All computation is correct.  
Allows for the participation of **all** group members.
- 3** Identifies and gives a partial explanation for the most economical trip.  
Identifies and gives a partial explanation for the trip with the most possible eagle sightings.  
All computation is correct.  
Allows for the participation of **some** group members.
- 2** Identifies but does not give an explanation for the most economical trip.  
Identifies but does not give an explanation for the trip with the most possible eagle sightings.  
Some computation is correct.  
Allows for the participation of **one** group member.
- 1** Student worksheet does not meet requirements.

Name \_\_\_\_\_

Worksheet #5

Date \_\_\_\_\_

**Directions:** Now that you have learned a lot about eagles and have planned a trip to go see them, write a letter to our principal to attempt to gain approval to go on this trip. You may write a draft of your letter on this paper, but your final letter should be written or typed neatly on your own paper. Be sure to include the following in your letter:

1. Cost of the trip (and what that cost includes)
2. The number of eagle sighted at that location
3. What we have been discussing in class about eagle sightings and populations
4. Complete sentences
5. Adequate support and details

\*If you don't think we should go on this trip, you may write that in your letter, but you will need to give a thorough explanation of your reasons.

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## Rubric for Oral Presentations

- 4** Identifies and gives a thorough explanation for the most economical trip.  
Identifies and gives a thorough explanation for the trip with the most possible eagle sightings.  
Allows for the participation of **all** group members.  
Presentation is well-prepared and follows a logical sequence.  
Presenters speak loudly and clearly.
- 3** Identifies and gives a partial explanation for the most economical trip.  
Identifies and gives a partial explanation for the trip with the most possible eagle sightings.  
Allows for the participation of **some** group members.  
Presenters speak loudly or clearly.
- 2** Identifies but does not give an explanation for the most economical trip.  
Identifies but does not give an explanation for the trip with the most possible eagle sightings.  
Allows for the participation of **one** group member.  
Presentation shows poor preparation.  
Presenters are difficult to hear.
- 1** Presentation does not meet requirements.

## Rubric for Persuasive Letter to Principal

- 4** Students responds:     •To all **3** letter requirements:  
                                    1. Most economical trip  
                                    2. Number of anticipated eagle sightings  
                                    3. Class discussion of eagle characteristics and populations  
                                    •With complete sentences  
                                    •By using persuasive language  
                                    •With adequate support and details
- 3** Student responds:     •To **2** letter requirements listed above  
                                    •With complete sentences  
                                    •With adequate support and/or details
- 2** Students responds:     •To **1** letter requirement listed above  
                                    •With complete sentences or with adequate support/details
- 1** Student does not meet requirements.